Atty. Dkt. No.: 059440/0138

WHAT IS CLAIMED IS:

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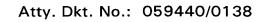
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- A plant system for producing a heterologous protein under defined, controlled environmental conditions, the plant system comprising a plant (a) transformed with an expression vector comprising a gene coding for the heterologous protein operably linked to a promoter that is selected for optimal expression under the defined environmental conditions of CEA; (b) that produces a large amount of plant biomass under the defined environmental conditions, and (c) that produces tissue and tissue extract wherein the heterologous protein is stable.
 - 2. The plant system of claim 1 wherein the plant is selected from the group consisting of *Solanum*, *Spinacia* and *Brassica*.
 - 3. The plant system of claim 1, wherein the plant is *Solanum*, the promoter is light-inducible and the defined environmental conditions of CEA include at least 12 hours of light per day.
 - 4. The plant system of claim 1, wherein the promoter is from the ribulose bis-phosphate carboxylase (Rubisco) small subunit gene.
 - 5. The plant system of claim 1, wherein the promoter is CO₂-inducible and the defined environmental conditions include between about 350 and 2,500 ppm CO₂.
 - 6. The plant system of claim 1, wherein the promoter is heat-inducible and the defined environmental conditions include a temperature between about 28 and 40°C.
 - 7. The plant system of claim 6, wherein the heat-inducible promoter is the promoter from the hsp80 gene.



25	8.	The plant system of claim 1, wherein the promoter is a
26	chemically	inducible promoter.
27	9.	The plant system of claim 8, wherein the promoter is from the pathogenesis-related beta 1,3 glucanase
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29		gene, lipoxygenase 1 gene or potato proteinase
30		inhibitor I gene.
31	10.	The plant system of claim 1, wherein the promoter is a
32		dark-inducible promoter.
33	11.	The plant system of claim 10, wherein the promoter is
34		from the potato proteinase inhibitor I or
35		aminotransferase gene.
36	12.	The plant system of claim 1, wherein the promoter is a
37		constitutive promoter.
38	13.	The plant system of claim 12, wherein the promoter is
39		from the tobacco rpL34 gene, the agrobacterium
40		nopaline synthase gene or the CaMV 35S gene.
	1.4	The plant quature of plains 1, wherein the plant is notate
41	14.	The plant system of claim 1, wherein the plant is potato
42	which prod	uces between about 0.2 and 5 kilog am fresh weight vines per
43	plant.	
44	15.	The plant system of claim 1, wherein the plant is mustard
45	which produces between about 0.2 and 250 grams dry weight greens per	
46	plant.	
47	/ 16.	A method of producing heterologous protein in a transformed
48	plant comp	rising the steps of:

49	transforming a plant with an expression vector	
50	comprising a gene coding for the heterologous protein	
51	operably linked to a promoter that is selected for	
52	optimal expression under defined environmental	
53	conditions of CEA;	
54	b. cultivating the plant under the defined environment	
55	conditions of CEA; and	
56	c. extracting the heterologous protein.	
57	17. The method of claim 16, wherein the plant is selected from	
58	the group consisting of Solanum, Spinacia and Brassica.	
59	18. The method of claim $\sqrt{16}$, wherein the plant is <i>Solanum</i> , the	
60	promoter is light-inducible and the defined environmental conditions	
61	include at least 12 hours of light per day.	
62	19. The method of claim 18, wherein the promoter is from the	
63	Rubisco small subunit gene.	
64	20. The method of claim 16, wherein the promoter is CO ₂ -	
65	inducible and the defined environmental conditions include between about	
66	350 and 2,500 ppm CO ₂ .	
67	21. The method of claim 16, wherein the promoter is heat-	
68	inducible and the defined environmental conditions include a temperature	
69	between about 28 and 40° C.	
70	22.The method of claim 21, wherein the heat-inducible promoter is	
71	the promoter from the hsp80 gene.	
72	23. The method in claim 16, wherein the promoter is chemically	

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inducible.



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74	24. The method in claim 23, wherein the chemically inducible
75	promoter is from the pathogenesis-related beta 1,3 glucanase gene,
76	lipoxygenase 1 gene or potato proteinase inhibitor I gene.
77	25. The method of claim 16, wherein the promoter is a dark-
78	inducible promoter.
79	26. The method of claim 25, wherein the promoter is from the
80	potato proteinase inhibitor I or aminotransferase gene.
	27. The method of Joine 16, subgrain the promotor is a
81	27. The method of claim 16, wherein the promoter is a
82	constitutive promoter. \
83	28. The method of claim 27, wherein the promoter is from the
84	tobacco rpL34 gene, the agrobacterium nopaline synthase gene or
85	the CaMV 35S gene.
86	/ 29. A method of making a plant system for production of a
87	heterologous protein comprising the steps of:
88	a. identifying a plant that produces a large amount of
89	plant biomass under controlled environmental
90	conditions, that can be rapidly propagated vegetatively
91	and produces tissues and soluble protein extracts that

b. transforming the plant with an expression vector comprising a gene coding for the heterologous protein operably linked to a promoter that is selected for optimal expression under the defined environmental

provide increased stability against proteolysis and

other damage to heterologous protein targets;

98 conditions of CEA; and

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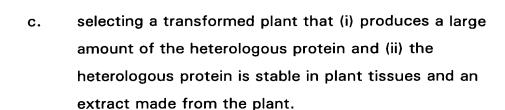
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- 30. The method of claim 29, wherein the plant is potato and is selected to produce between about 0.2 and 5 kg fresh weight vines per plant.
- 31. The method of claim 29, wherein the plant is mustard and is selected to produce between about 0.2 and 250 grams dry weight greens per plant.
- 32. The method of claim 29, wherein the plant is potato and is selected to produce between about 10 and 1300 kg heterologous protein/acre/year.
- 33. The method of claim 29, wherein the plant is mustard and is selected to produce between about 8 and 1000 kg heterologous protein/acre/year.
- 34. The method of claim 29, wherein the plant is *Solanum*, the promoter is light-inducible and the defined environmental conditions include at least 12 hours of light per day.
- 35. The method of claim 34, wherein the promoter_is_from the ribulose bis-phosphate carboxylase (Rubisco) small subunit gene.
- 36. The method of claim 29, wherein the promoter is CO₂-inducible and the defined environmental conditions include between 350 and 2,500 ppm CO₂.

